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Remarks

Thorough examination by the Examiner is noted and appreciated.

The claims have been amended to correct grammatical errors.

No new matter has been added.

Claim Rejections under 35 USC 102

1. Claims 1,2,5, 21, 22, 23, 24, and 25 stand rejected under 35 USC 102(b) as anticipated by Korthius et al. (USPUB 2004/0074518).

Korthius et al. disclose a method for CMP of semiconductor substrates, post-CMP storage of semiconductor substrates and post-CMP cleaning of semiconductor substrates (see Abstract). Korthius et al. teach that their method is particularly suited to

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polishing, storing, and then cleaning semiconductor substrates with **hydrophobic surfaces** (see Abstract).

Korthius et al. disclose a 3 step CMP process, the first two steps to polish a copper layer (see Figures 3A, 3B; paragraph 0043; 0044; paragraph 0047-0049) to first polish a copper layer and the third step is to polish a barrier layer and expose a dielectric layer underneath (paragraphs 0050-0051). Korthius et al. disclose in all three polishing steps (carried out on separate platens) i.e., in the first copper polishing step (paragraph 0044), the second copper polish step (paragraph 0048), and third polishing step (paragraph 0050), **spraying a high pressure water and surfactant** (surfactant of undisclosed composition) on the pad to clean the pad prior to the polishing steps.

Korthius et al. also disclose that following the first CMP step, that the wafer is **rinsed with a commercially available post-clean surfactant** (paragraph 0047) (surfactant of undisclosed composition).

Korthius et al. also disclose that following the second copper and third polishing steps the wafer is **rinsed with BTA**

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(paragraphs 0049, 0052) instead of a post-clean surfactant.

Korthius et al. teach that the **BTA rinse makes the wafer surface hydrophobic** (see paragraphs 0054, 0055). Korthius et al. teach that a hydrophobic surface (i.e. rinsed with BTA) inhibits subsequent cleaning of a batch of wafers due with aqueous cleaning solutions due to difficulty in wetting of the surface (e.g., wafers cleaned as a batch following CMP) where the wafers are stored prior to batch cleaning in a storage liquid following CMP of each wafer (paragraph 0054).

Korthius et al. teach that **BTA may be added to the storage liquid as well** (paragraph 0057) and that the post-CMP cleaning process (**for cleaning a hydrophobic surface**) includes cleaning liquids that preferably are aqueous liquids **having low-pH including an acidic component** such as hydrochloric, acetic, and citric acid (paragraph 0060), **as well as a source of mechanical agitation** (paragraph 0062) such as sonic energy. Korthius et al. teach using isopropyl alcohol in a drying step (paragraph 0064).

Thus, Korthius et al. do not disclose several aspects of Applicants disclosed and claimed invention including:

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A method of cleaning a wafer surface, comprising the steps of:

"applying said surfactant composition solution to said wafer surface after at least one of said plurality of polishing steps to render said wafer surface hydrophilic; and

then rinsing said wafer surface."

As noted above, Korthius et al. only disclose rinsing the wafer with an undisclosed surfactant following the first copper polishing step and rinsing with BTA (to make hydrophobic) following the second copper polishing step and following the barrier layer polishing step.

In addition, Korthius et al. clearly fails to disclose the elements of Applicants invention in claims 13:

"A method of cleaning a **hydrophobic wafer surface**, comprising the steps of:

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providing a wafer surface comprising at least one of a metal and a dielectric layer;

providing a **surfactant composition solution comprising an aqueous alcohol solution;**

subjecting said wafer surface to a plurality of polishing steps;

applying said surfactant composition solution to said wafer surface **after each of said plurality of polishing steps** to form a hydrophilic surface; and

rinsing said wafer surface **with water.**"

Korthius et al. is clearly insufficient to anticipate Applicants disclosed and claimed independent claims as well as Applicants dependent claims.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

"The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor*

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Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Applicants specifically reject the **assertion of inherency** by Examiner in the teachings of Korthius et al. "that by virtue of the surfactant action, the surface of the wafer inherently acquires hydrophilicity" with respect to the teaching of Korthius et al. of rinsing the wafer with a commercially available surfactant of undisclosed composition following the first copper CMP step (paragraph 0047). Applicants have provided no support for such an assertion; moreover, nowhere does Korthius et al. teach that the copper polishing surface is hydrophobic following the first copper polishing step.

Examiner is also mistaken that Korthius et al. teach rinsing with a surfactant following the barrier layer polishing step **or a deionized water rinsing step**. Rather, Korthius et al. specifically teach rinsing the wafer surface with a **BTA rinse** following the second copper polishing step (paragraph 0049) and following the barrier layer polishing step (paragraph 0052) which Korthius et al. teach **makes the wafer surface hydrophobic** (paragraph 0056).

"To establish inherency, the extrinsic evidence must make

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clear that the missing descriptive matter is **necessarily present** in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." *In re Oelrich*, 666 F.2d 578,, 581-582, 212 USPQ 323, 326 (CCPA 1981).

"In relying on the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art." *Ex Parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

Claim Rejections under 35 USC 103

2. Claims 3, 8, 11-13, 15, 16, and 26-30 stand rejected under 35 USC 103(a) as being unpatentable over Korthius et al., above in view of Bessho et al. (US 6,440,856).

Applicants reiterate the comments made above with respect to Korthius et al.

On the other hand, Bessho et al. disclose a cleaning agent

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for cleaning semiconductor parts before and/or after CMP (see Abstract; col 2, lines 46-48). Bessho et al. disclose that the cleaning agent includes a co-polymer having a sulfonic acid and or carboxylic acid group (col 2, lines 6-11) which may include a second co-polymer including phosphonic acid, hydroxyl group containing monomers, "monomers **having a skeleton derived from ethylene oxide or propylene oxide** (col 2, lines 30-38) such as **polyoxyethylene monomethacrylate** (col 5, lines 18-29) used in an amount of 5 to 50 wt % (col 5, lines 30-38).

Bessho et al. separately teach the addition of a surfactant to the cleaning solution (col 2, lines 41-45) which may include **sulfates of higher alcohols** (col 10, lines 6-9).

Bessho et al. also disclose dissolving the cleaning agent including the co-polymers in a **hydrophilic organic solvent** (col 9, lines 1-15) such as **alcohols, ethers, and ketones**, which may include **n-octyl alcohol** (col 9, lines 14-23).

Bessho et al. generally teach that the cleaning agent may be used at any pH (col 11, lines 3-13) and on all surfaces including semiconductor substrate, interlayer insulating films, and

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metallic wiring (col 11, lines 16-24).

Thus, even assuming *arguendo*, a motivation for combining the teachings of Korthius et al., who teaches **cleaning hydrophobic surfaces** with a **surfactant of undisclosed composition** with the teachings of Bessho et al., who teach a cleaning agent (dissolved in a hydrophilic organic solvent e.g., alcohol i.e., nonaqueous) **for use before or after CMP** and including a surfactant (which may include a **sulfate of a higher alcohol**) and nowhere distinguish between a **hydrophobic or hydrophilic cleaning surface** or discuss or suggest the effect of the cleaning agent on the hydrophobic or hydrophilic state of the cleaning surface, such combination does not produce Applicants disclosed and claimed invention.

Applicants respectfully point out that Examiner is mistaken in the assertion that "Bessho emphasizes that the use of alcohols is needed for imparting hydrophilicity to the surface to be cleaned" and does not cite to any portion of Bessho where such an assertion is contained, and Applicants can nowhere find any such teaching in Bessho.

"Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The

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teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Conclusion

The cited references, either singly or in combination, fail to produce Applicants disclosed and claimed invention and therefore fail to make out a *prima facie* case of anticipation or obviousness with respect to Applicants disclosed and claimed invention.

Based on the foregoing, Applicants respectfully request Examiner to withdraw Finality of Rejection, and reconsider Applicants claims, which Applicants submit are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited.

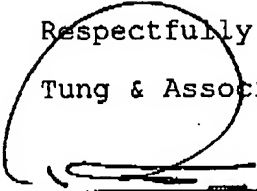
In the event that the present invention as claimed is not in a condition for allowance for any other reasons, the Examiner is respectfully invited to call the Applicants' representative at his Bloomfield Hills, Michigan office at (248) 540-4040 such that

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necessary action may be taken to place the application in a
condition for allowance.

Respectfully submitted,

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